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This report describes the present status, services, and applications of three projects established in 1966 in the Austin Public Schools. These projects, now fully operational, involve information processing, school-wide test scoring and analysis, and a data bank. The information system was established at a junior high school and a senior high school to produce report cards for students at the two schools and eventually, as time and equipment would permit, to perform other services to the school. The project for school-wide test scoring and analysis was initiated to save clerical and professional time at the individual school and central office levels. Major products of this project include individual school and school-wide norms and information for use in research projects. The data bank project was instituted at a junior high school to obtain as much information as possible concerning the students. Additional discussion of the projects deals with data gathering and storage, information currently on file and available for research use, programs written for the projects, and personnel and facilities. (HW)

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University of Texas
Research and Development Center for Teacher
January 25, 1967 Education

COMPUTER APPLICATIONS TO SCHOOL MANAGEMENT PROBLEMS

Report No. II

Bill D. Lamkin

During the past five years information processing systems for public schools have been developing on widely varying fronts. These include systems for individual schools, public school districts, and state-wide application. Although there is much duplication within the approaches, the wide variety of systems emphasizes once more the uniqueness of the individual school and the importance of designing information systems which will meet the needs of the individual school. In spite of duplication in the systems that are being developed, there is at the same time a great deal of innovation and uniqueness about each of the projects. Where state-wide systems are being developed (i.e., California and Iowa) an effort is still made, with varying success, to meet the need of the individual school with a minimum amount of standardization. The strong state-wide organization of the testing program in Iowa contributes to the feasibility of a state-wide system for that state; the powerful state department of California makes feasible the establishment of a state-wide system in that state. Even with these advantages, however, there are still many problems in such a large scale approach.

Regardless of the problems that educators may face, they are quickly admitting that the solution to many management problems which they face lies in the application of computer techniques. Writing in the January 14, 1967, issue of the Saturday Review, C. H. Springer foresees four major activities for the computer in educational systems of today and tomorrow: First, the computer can play a vital role in the administration of education; second, the computer can play an important role in research; third, with the continued progress in computerized information technology, it is steadily becoming cheaper to store, transmit, manipulate, and display information in any of several different media; and fourth, computers can substantially enhance the learning process.

It was in reference to the first two points made by Mr. Springer that the project of information processing was initiated by the Research and Development Center within the Austin Public Schools. A previous report, dated February,

1966, set forth the suggested approach to establishing an information processing system in the Austin Public Schools. It is noted that the suggested procedures for implementation have been altered to fit the needs of the schools, to meet the limitations of time, personnel and hardware available, and to fit the development of the data processing system within the school district. The major changes from the original proposal are as follows:

1. Due to a limitation of application and the lack of personnel available, work has centered in the secondary schools. Applications to elementary schools are yet to be developed although organizational plans and suggested services have been developed.
2. Applications have centered at the local school level with the exception of school-wide test analysis projects. This approach was followed since it is felt that the school district is fast expanding its operation to take care of the central office applications. Teacher personnel was an area which was specifically suggested for coverage in the initial report. Limitations of the above type, plus the fact that this area does not tie in with other R & D projects, have necessitated the postponement of work in this area.

In February, 1966, work was begun in setting up a pilot program in information processing for the Austin Public Schools utilizing Lamar Junior High School and McCallum Senior High School. Since that time the project has been broadened to include two additional pilot programs: one, involving the test analysis for the entire school system; and another, the building of the data bank for Porter Junior High School. In the first two projects the primary objective has been to eliminate the paper work for teachers, counselors, and administrators, at the local school and central administrative level, while at the same time establishing a back log of information for building a data bank. In the other project at Porter Junior High School the purpose has been the immediate establishment of a data bank for research purposes in connection with projects of the R & D Center. At the present time all three projects are well under way, having completed the pilot stage and begun full operation. The purpose of this paper is to describe the present status of these projects, together with the services and applications which have come from each.

I. Information System for Lamar Junior High School and McCallum Senior High School

In instituting an information system one of the first objectives is to alleviate problems of paper work which are

presently faced by the local schools. It was agreed by the administrators of the two schools involved that a common problem revolved around the periodic reporting. The system then in use involved a separate report card for each student for each of his classes. In addition, the grades assigned by the teacher had to be recorded by the student's advisor on a permanent record form to be kept in the office. Additional information was also gathered by hand including lists of failures, lists of students making honor roll, class rosters, parent/student rosters. In this procedure a large amount of teacher and clerical time was expended in recopying and reviewing records. From the standpoint of the R & D Center the reporting service offered a good beginning for the establishment of a data bank, since student course grades would form a portion of the basic data desired in such an installation. Therefore, the project was initiated with the purpose of producing the report card for students at the two schools. The enrollment in the two schools is approximately 3300.

In order to produce such a product, however, it was necessary that basic information be accumulated for students to be involved. This information includes the personal information concerning the student as well as his schedule for the coming year. As teachers provided the grades at the first grading period, the collection of current data was initiated. To this current data is being added the information from tests administered during the year. Figure 1 illustrates some of the products which have been produced from this data. Samples of the data gathering instruments and of the products are included in the appendix of this report.

The emphasis of this project has been upon rendering specific services to the school upon the basis of current data. It has been found that in instituting information systems this approach is better received than an attempt at emphasizing the research potential. The immediate use of the data for research is limited by a lack of depth; however, after a period of one year, the major portion of which will be spent anyway in instituting a system, sufficient data is on hand to institute some longitudinal analyses, such as comparison of grades from one level to another, a study of the predictive validity of test scores, or a study of failure trends. The major advantage of gathering data in this way is that the data is more complete and greater care can be taken to insure the accuracy of all data stored in the bank.

The reporting system initiated in the fall of 1966 in these two schools is now operating smoothly with a minimum amount of errors. It is no longer considered to be a pilot project, but is an operational system. Additional applications, however, could be instituted on a pilot basis as time, personnel, and equipment permit. These additional applications in-

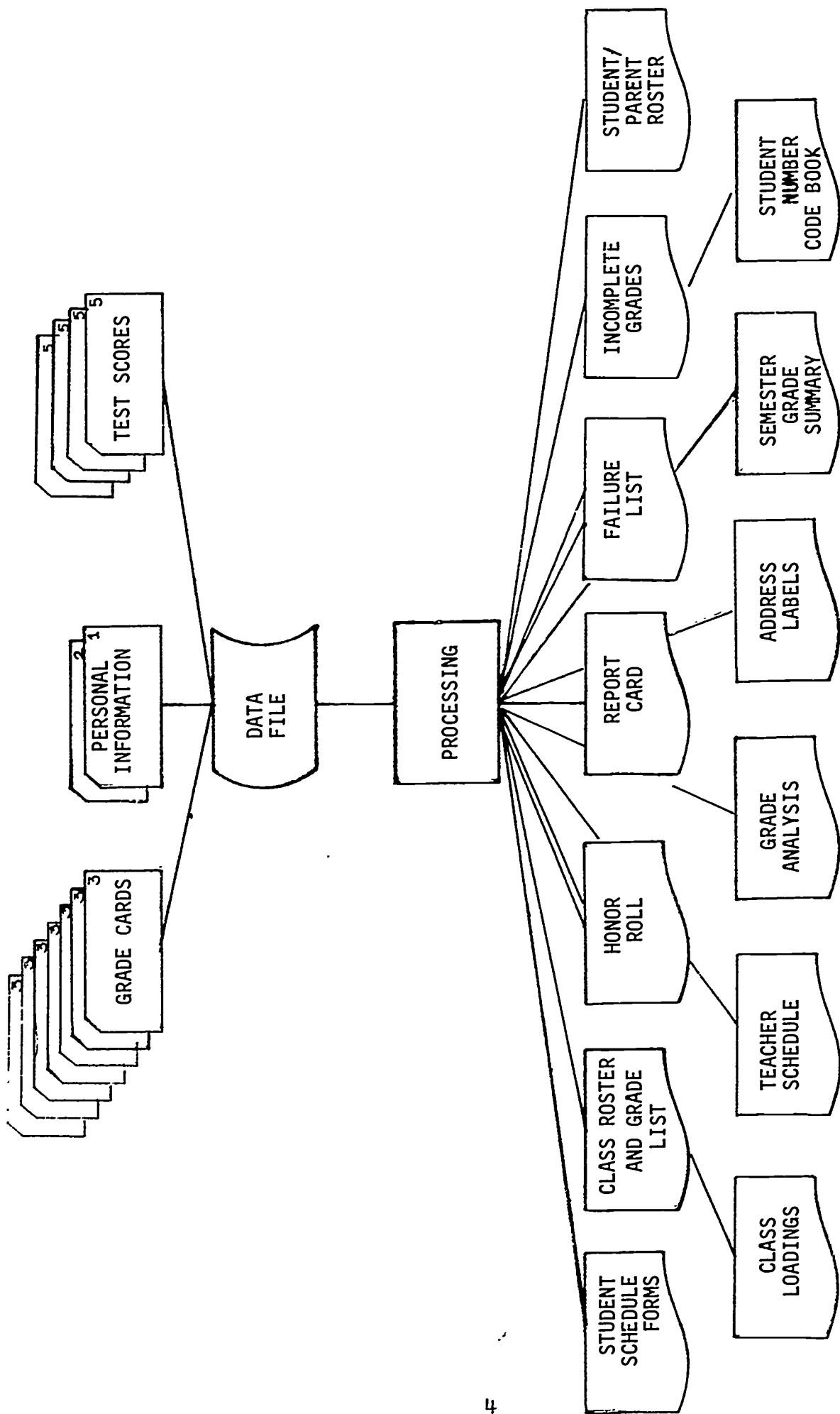


FIGURE 1: INFORMATION PROCESSING AT LAMAR AND McCALLUM SCHOOLS

clude aids to counselors through comparison of test data and classroom performance, the summary of courses taken in reference to the requirements for graduation, and the design of a permanent record form compatible with the system's design. As the school district takes over the reporting phases of the program more R & D time can be spent in these additional applications.

II. School-wide Test Scoring and Analysis

Test scoring, recording, and analysis of scores occupies a large portion of time of the central office Counseling and Guidance staff. In an effort to remove some of this time-consuming chore from the staff, a certain amount of work has been computerized. In the spring of 1966 scores from the California Achievement Test for five junior high schools were converted and summary normative reports prepared using punched information from the 1230 scoring machine and programs on the CDC 1604. In the fall of 1966 this program was extended to include all of the conversion of scores and production of normative statistics for second, fourth, and seventh grade California Mental Maturity Test. Due to the nature of the test, second grade tests were scored by hand and raw scores derived. Fourth and seventh grade tests were scored by the 1230 scanner and punched output was obtained. Identifying information was punched into these cards and cards were punched for second grade tests. Using this card input the scores were converted to IQ scores for the three areas of the test and punch card output was obtained. From this final punch card output reports were prepared for the individual schools and for the central office personnel. This process is summarized in Figure 2, and sample reports are included in the appendix.

The major objective of this particular project is to save clerical and professional time at the individual school and central office level. By automating the conversion of scores the clerical staff has been able to devote their time to other duties. In addition, gummed label reports for the permanent records have been produced. A major product, however, of this procedure has been the production of individual school norms and school-wide norms. In the past these two products have been available only on a very sketchy basis and then only after a major part of their usefulness had passed. More important has been the fact that the information thus gathered has become available for the data bank of the individual schools where we are working and for school-wide application in research projects as appropriate.

III. Data Gathering at Porter Junior High School

In the fall of 1966 a major project of the R & D Center was begun at Porter Junior High School. In connection with this

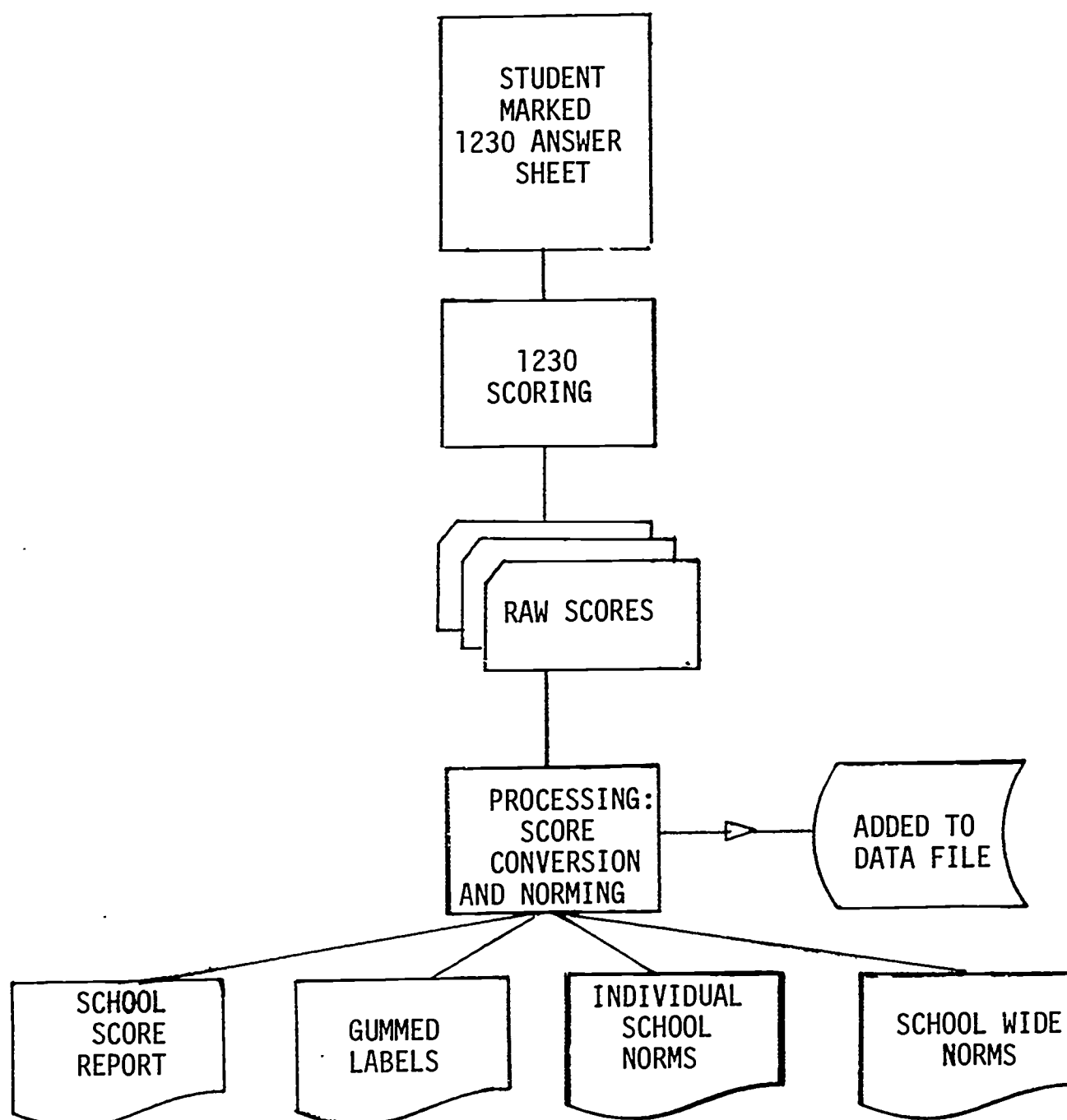


FIGURE 2: TEST SCORING, REPORTING AND ANALYSIS

project, it was felt desirable that as much information as possible concerning the pupils of the school should be available in retrievable form. In connection with this request a project was instituted with the purpose of gathering complete history and current information on all of the students enrolled in Porter Junior High School and the establishment of a system whereby the information could be updated constantly. The enrollment of the school is approximately 1300.

At the present time this project is well underway, the current information being on file and history information for ninth grade students having been collected. History information for seventh and eighth grade students will be collected in the near future. Updating procedures have been instituted through the cooperation of the school principal and counselors, and has been progressing satisfactorily.

In connection with this project and as an immediate service to the school, all of the products which have been given to McCallum and Lamar with the exception of those related to the report card have been given to Porter Junior High School as well. In addition, complete listings of the data collected for each student will be made available to the principal of the junior high school when the collection is completed. The data thus collected will be available for use by the school and will be released to research projects only with the approval of the school.

IV. Comments Concerning Data Gathering and Storage

Data Gathering

The most time-consuming element of the afore-mentioned projects has been the gathering of data -- both history and current; the experience gained has been a major product. Many data gathering devices were investigated before it was determined that the most useful system presently available was the mark-sense card. The mark-sense card makes it possible for data to be punched directly into the document, thus eliminating the necessity of transposing from one document to another or for individual key punch. This system is not useful for gathering alphameric information. However, in most cases alphameric information can be prepunched and all other data can be coded as numeric information. The mark-sense system is used for grade reporting and has been used in the collection of basic data at Porter Junior High School. There has been a minimum difficulty with bad marks or unread marks although such a system necessitates the use of a special electrographic pencil. MRC is presently making available a much more versatile data gathering machine identified as the MRC 1500. This machine makes it possible to gather alphameric as well as numeric information. The cost of this machine and its capacity make it feasible only for extremely large installations, that is, installations serving

an entire state or a large region of a state. Undoubtedly many improvements in data gathering equipment will be made during the coming years as results of the needs which are so prevalent in public schools.

Organization and Storage of Data

Storage of current data from the Lamar-McCallum project has been handled on punched cards. It is anticipated that as this current data becomes history, data storage will be handled on tape and/or disks. Likewise, the history data being collected at Porter Junior High School is being collected on cards but it is being organized and placed on tape for retrievability. Although the random access storage of the disks is more attractive in many ways, the low rate of use at the present time makes this method of storage too expensive to be justified. It is anticipated that the solution to the storage problem is the use of disks for the storage of current data and the use of tape for the storage of history data. Thus in producing current reports random access could be used with the disk drive while in doing research problems the slower tape access could be used.

V. Information Currently on File and Available for Research Use

A. School-wide Data

1. Spring, 1966, Testing California Achievement Tests Seventh Grade for the following schools: (present eighth grade students)
 - a. Allen Junior High School
 - b. Baker Junior High School
 - c. Lamar Junior High School
 - d. Porter Junior High School
 - e. Lanier Junior High School
 - f. Pearce Junior High School
2. Fall, 1966, California Short Form Mental Maturity scores for the following:
 - a. All junior high schools, seventh grade
 - b. All elementary schools, second and fourth grades, as completed
3. Fall, 1966, testing DAT scores for all tenth grade students

B. Individual School Data (in addition to the above)

1. Lamar Junior High School -- all current grades and personal information
2. McCallum Senior High School -- all current grades and personal information
3. Porter Junior High School -- all current personal and schedule information -- history information for ninth grade students (history information for seventh and eighth grade students and current grades for all students will be available during the spring, 1967)

VI. Programs Written for School Management Project

A total of about fifty computer programs have been written and used in connection with projects mentioned above. A major portion of these programs are in autocoder for use with the IBM 1401 where most of the work has been done. The remainder of the problems are in FORTRAN for use of the CDC 1604 and the 6600. The following is a list of programs. Many of the programs were for special purposes and thus used only once. The following list of programs are those which consistently are used in the project.

A. Autocoder Programs

1. Print student's schedule record form
2. Report card programs (three separate programs)
3. Print personal information, form 0001
4. Print form 1005 -- Student Address Roster
5. Print form 1006 -- Student/Parent Address Roster
6. Punch cards for data gathering
7. Print Advisory List
8. Print Advisory Master
9. Print Code Book from personal cards
10. Print Master Schedule
11. Print Class List and Grade Report
12. Print Class Distribution Form
13. Print Student Schedule
14. Punch class cards from single summary of schedule
15. Compute grade averages by academic area and total
16. Produce frequency distribution and normative statistics
17. Print score reports, California Achievement Tests
18. Originate Student Code Numbers (three programs)
19. Print gummed labels (four programs)
20. Print score reports, California Mental Maturity (four programs)
21. Compute and print honor roll, McCallum and Lamar (two programs)
22. Print failure list

B. FORTRAN Programs

1. Programs to convert raw scores to percentiles or standard scores
 - a. California Achievement Tests, Seventh grade
 - b. California Mental Maturity, Level 1
 - c. California Mental Maturity, Level 3
2. Compute grade averages by academic area and total

VII. Personnel and Facilities

The above mentioned projects were instituted and developed by Mr. Bill Lamkin, Research Associate with the R & D Center.

In November, 1966, a research assistant was employed on a one-half time basis to help with the projects. In addition, secretarial, tab operator, and key punch help has been made available by the R & D Center as it was needed and available. A part of the initial key punch work was done by the data processing classes at Austin High School during the spring of 1966.

Access to processing facilities has been a source of inconvenience and delay in the project. No one installation available to R & D has all of the necessary equipment; therefore, processing must be done in five different locations: card handling is generally taken care of in the data processing installation of the R & D Center on Little Campus; computer work is done on a time-available basis on the IBM 1401 in the CAI installation in Sutton Hall (work is done primarily in the evenings or early mornings when CAI work is not being done); mark-sense punching has been done on a job basis by the City at the installation in the Municipal Building; interpreting is completed either at the Computation Center or at the School's Administration Building; and bursting of the completed printouts, when necessary, is done with the equipment in the Auditor's Office, Main Building of the University. The different locations have necessitated much extra transporting of materials, and the time-lag between gathering of data and output has been extended because of problems in scheduling equipment. These problems have been minor, however; the limitations were fully understood by all concerned before the project was instituted.

All materials, personnel, and facilities for the projects have been supplied by the R & D Center without cost to the schools. The schools where projects are being conducted have altered their procedures and made available secretarial help for the flow of updating materials.

APPENDIX

On the following pages are copies of sample forms and printouts which have been provided in connection with the projects described. These are merely samples and are not intended to furnish a complete picture of the products which have been made available. The sample forms and the areas to which they pertain are as follows:

<u>Page</u>	<u>Forms</u>
1	California Test of Mental Maturity Summary of Scores and Gummed Labels
2	Student Schedule Record Form
3	Grade Reporting Mark-Sense Card, Class Grade List, Failure List, Honor Roll
4	Report Cards
5	Student/Parent Address Rosters
6	Personal Information and Master Code Book
7	Master Schedule and Student Schedule Forms

CALIFORNIA TEST OF MENTAL MATURITY

SCHOOL 423 GRADE 2 DATE OF TEST 11/66 CLASS 1

STNO	NAME	CA	L-IQ	NL-IQ	T-IQ
01	BEST JAMES	113	83	73	76
02	CARR JJOE	89	67	63	66
03	DAVIS JAMES	86	104	123	114
04	EVANS CAROL	96	97	100	98
05	FALL GUY	89	86	101	94
06	UBLIC JANE	94	90	93	91
07	QUINTON ADAM	97	117	103	111
08	RUST STELLA	87	108	94	100

JAMES 110100 CMM2 10/66 LIQ NLIQ TIO
 83 73 76
 CARR JJOE 110200 CMM2 10/66 LIQ NLIQ TIO
 67 63 66
 DAVIS JAMES 110300 CMM2 10/66 LIQ NLIQ TIO
 104 123 114
 EVANS CAROL 110400 CMM2 10/66 LIQ NLIQ TIO
 97 100 98
 FALL GUY 110500 CMM2 10/66 LIQ NLIQ TIO
 86 101 94
 UBLIC JANE 110600 CMM2 10/66 LIQ NLIQ TIO
 90 93 91
 QUINTON ADAM 110700 CMM2 10/66 LIQ NLIQ TIO
 117 103 111
 RUST STELLA 110800 CMM2 10/66 LIQ NLIQ TIO
 108 94 100

PORTER JUNIOR HIGH SCHOOL
AUSTIN, TEXAS
MR. R. S. DAVIS, PRINCIPAL

BURCHARD MICHAEL DWAIN
STUDENT NUMBER 30506925
ADVISORY WOOD

GRADE 9 TELEPHONE GL34484 LOCKER

			1966/67 SCHEDULE							
PBR SUBJECT	TEACHER	ROOM	1	2	3	AVE	4	5	6	AVE
1 GEN SCI 1	WOOD	207	*	*	*	*	*	*	*	*
2 ALGEBRA 1	MOSS	A10	*	*	*	*	*	*	*	*
3 WRL GRHY 1	REEK	A17	*	*	*	*	*	*	*	*
4 TYRING 1	LUGAS	200	*	*	*	*	*	*	*	*
5 ENGLISH 1	WOOD	A16	*	*	*	*	*	*	*	*
6 SPEECH 9TH	SMOCK	A25	*	*	*	*	*	*	*	*
*6 RE BOY 1	TOLBERT	GYM	*	*	*	*	*	*	*	*

*INDICATES CLASS WHICH MEETS ON EVEN NUMBERED DAYS

ATTENDANCE RECORD

	1	2	3	4	5	6	TOT
DAYS ABSENT	*	*	*	*	*	*	*
DAYS PRESENT	*	*	*	*	*	*	*
TOT ENROLLMENT	*	*	*	*	*	*	*

NAME BURCHARD MICHAEL DWAIN GRADE 9 TELEPHONE GL3-4484
ADDRESS 1301 DWYCE , AUSTIN, TEXAS
BIRTHDATE 03/11/52 SEX MALE
PARENT/GUARDIAN MR & MRS CHARLES F BURCHARD
RELATIONSHIP ONE OR BOTH PARENTS
BUSINESS PHONE GL4-4661

LAST SCHOOL ATTENDED PORTER JUNIOR HIGH

ACHIEVEMENT TEST SCORES
DATE TEST ARITH RDG

MOORE BUSINESS FORMS, INC., DENTON, TEXAS

TEACHER	107	HIBBS	PERIOD	1											1
		NAME	COURSE		FIRST		SCNO		THIRD				EX	AV	CR
					GR	AB	GR	AB	GR	AB					
20517275*		DOE JANE	283	SPANISH 3	B	02	B	02	I	13	C	C			.5
20545500*		HARRIS JOE	283	SPANISH 3	B	02	B	02	F	15	C	C			.5
20508775		JONES JOHN	283	SPANISH 3	B	02	B	02	C-	00	C	C			.5
20519100		LAMAR JANE	283	SPANISH 3	A-	02	B#	03	F	08	B#	B-			.5
20565725*		LAMAR JOE	283	SPANISH 3	B	02	B	02	I	13	C	C			.5
20568013		MCCALLUM J	283	SPANISH 3	B#	03	B	05	C-	04	C#	B-			.5
20500375*		MCCALLUM JANE	283	SPANISH 3	B	02	B	02	F	01	C	C			.5
20557775*		PUBLIC JOH	283	SPANISH 3	B	02	B	02	C-	17	C	C			.5
20522948*		PUBLIC JAN	283	SPANISH 3	B	02	B	02	I	10	C	C			.5

FAILURE LIST		MCCALLUM HIGH SCHOOL SEMESTER			
20521698	DOE JOHN	PE BOY 5	1	PETERSEN	11
20521698	DOE JOHN	ENGLISH 3	4	KINNARD	11
20577975	HARRIS JAN	ENGLISH 8	3	WHITESD	11
20548500	HARRIS JOE	ENGLISH 3	1	ALLEN	10
20548500	HARRIS JOE	GEN SCI 1	3	GLENN	10
20565725	LAMAR JOE	BOOKPG 1	4	FLELLR	11
20500375	MCCALLUM J	ENGLISH 3	4	LEARY	10

MCCALLUM HIGH SCHOOL HONOR ROLL			
BEST JOAN	1	42	10
CAR HOWARD	3	29	10
DOE JOHN	3	32	10
EVANS JOE	2	37	10
FOSTER RUTH	2	33	10

30547725	NOONER ROGER EARL	148	RDG 7TH	14	BLUNK	20710	
STUDENT NUMBER	JOENT	JOENT	JOENT	JOENT	TEACHER NAME	TEACHER	
AUSTIN INDEPENDENT SCHOOL DISTRICT			GRADE	ABSENSES	EXAM	AVERAGE	CREDIT
AUSTIN, TEXAS			1	0000			00
INSTRUCTIONS FOR MARKING CARD			2	0000			00
1. USE SPECIAL MARK SENSE PENCIL ONLY			3	0000			00
2. MAKE ONLY ONE MARK IN EACH COLUMN			4	0000			00
3. ENTER MARK CLEARLY AND FIRMLY WITH-			5	0000			00
IN THE MARKING OVAL THUS C=			6	0000			00
4. MAKE CLEAN ERASURES IF NECESSARY			7	0000			00
			8	0000			00
			9	0000			00
STUDENT NUMBER	STUDENT	SUBJECT CODE	SUBJECT NAME	TEACHER NAME	TEACHER	ROOM NO.	GRADE
1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64
65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88
89	90	91	92	93	94	95	96
97	98	99	100	101	102	103	104
105	106	107	108	109	110	111	112
113	114	115	116	117	118	119	120

TRIPPLICATE
REPORT CARD
AUSTIN INDEPENDENT SCHOOL DISTRICT
IRBY B. CARRUTH, Superintendent
AUSTIN, TEXAS

DUPLICATE

REPORT CARD
AUSTIN INDEPENDENT SCHOOL DISTRICT
IRBY B. CARRUTH, Superintendent
AUSTIN, TEXAS

GRADES

ORIGINAL

REPORT CARD
AUSTIN INDEPENDENT SCHOOL DISTRICT
IRBY B. CARRUTH, Superintendent
AUSTIN, TEXAS

KAMAR JUNIOR HIGH SCHOOL

REPORT OF BOCK RONALD RICHARD

GRADE 9

REPORT PERIOD ENDING 2/20/67

PER	SUBJECT	TEACHER	ADVISORY			WOOD			CREDITS
			1	2	3	EX	AV.	1, 2, 3	
1	ENGLISH 1	WOOD	B+	A	A+	A	A+	00 02 02	1.5
2	GEN SCI 1	WOOD	B	C+	B+	B+	B+	00 02 02	1.5
3	REU MATH	MOSS	C	C+	C	C	C	01 02 02	1.5
4	WRU GRHY 1	KANTER	C+	C+	F	C+	C+	00 02 02	1.5
5	SPANISH 3	CRAWLEY	C+	E+	D	C+	C	00 02 02	1.5
6	MUSIC SEM	EDWARDS	B+	A+	A+	B+	B+	02 03 02	1.5
6	PE BOY 1	TOBBERT	A	A	A	A	A	02 02 02	1.5

FORM 1010

EXPLANATION OF GRADES
A - EXCELLENT 90 - 100
B - GOOD 80 - 89
C - FAIR 70 - 79
D - PASSING
F - FAILURE

A GRADE OF D IS NOT RECOMMENDED FOR COLLEGE ENTRANCE

RETURN SIGNED REPORT CARD TO ADVISOR

E. J. M. SANCHEZ
PRINCIPAL

SIGNATURE OF PARENT OR GUARDIAN

STUDENT ADDRESS ROSTER FORM 10065

[illegible]

SECRET

11-11-61

